

## Intelligent Relays

### SD Series Bi-Stable Relays

An all-vehicle battery disconnect, designed to support remote power switching applications. Great choice for high continuous current passage, large engine starting needs and high ambient temperatures. 300A continuous current per pole (4/0 input/output cables) and sealed to IP66/IP69K.

**880103, SD 600A Single Pole**  
**880107, SD 300A Dual Pole**



### HD Series Bi-Stable Relays

General purpose bi-stable relay. Very low current draw to maintain closed circuit. Remotely-operated 300A disconnect for high-amperage circuits. Eliminates routing of heavy gauge cables to user-accessible mechanical disconnect switches, lowering system costs. Sealed to IP67/IP69K.

**880086, HD Relay 12V DC**  
**880088, HD Relay 24V DC**



### Bi-Stable Relay

**24200**  
 110A (carry only) continuous duty SPST Normally Open, 12V DC.



## Solid State Relays

### 48521, 200A Relay

Functions as a Normally Open relay or as a bi-stable relay, depending on which wires are connected by the user. Non-arcing and ignition-protected – can be used in hazardous environments. Solid-state reliability. Low control and quiescent currents. Protected against reverse polarity, overcurrent, short circuit and overheating. Optional remote status LED gives warning to vehicle operator. Ingress protection to IP67. 200A continuous at 12V DC.



### 48715 100A Solid State Relay

100A at 12V or 24V DC. 4.5 x 4.3 x 3.1" H (114.3 x 108.6 x 79.0mm) Units are resistant to high vibration and exposure to roadsplash and salt spray. Can be mounted in relatively inaccessible places, compared to electromechanical types which need to be accessible for potential replacement. Sealed to IP67, with sealed Deutsch connector. High reliability unit is protected from over-temperature, overcurrent, overvoltage, and under-voltage. Minimal stand-by 1mA draw on battery. Protects vulnerable onboard electronics such as GPS, phone, computer. Solid-state switching creates less electrical noise and interference, and eliminates spikes. Units are distributor-programmable. Units are autoranging (they work with 12V or 24V DC).



## ORDERING

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## Solid State Relays (Cont.)

### 48716 250A Solid State Relay

250A at 12V or 24V DC.  
6.6 x 4.8 x 3.0" H  
(167.0 x 122.0 x 76.0mm)



### 48785, Electronic Relay 85A 9-31V DC

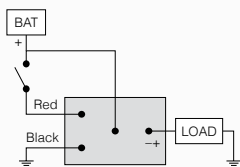
Fully solid-state, with no moving parts to wear out. The Electronic Relay stands up to over 20 million On-Off cycles. It is completely sealed, ignition protected, and withstands vibration and adverse environments. Perfect for vehicles that are always on the move. Use the Electronic Relay in both 12V or 24V applications... or any voltage between 9 and 31V.



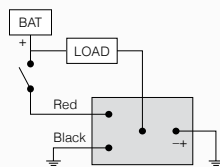
- » Relays can be used in both High Side and Low Side switching applications.
- » Needs only a very low control current.
- » Suitable for high inrush demand circuits.

#### Specifications:

- » 9 - 31V DC, 85A continuous or 175A intermittent.
- » Low On resistance of .005Ω
- » Low control current of .02A (max) means lighter wires, smaller harnesses.
- » On/Off control voltage must be identical to the system voltage.
- » Wide temperature operating range -40°C to + 85°C without derating.



High side switching application



Low side switching application

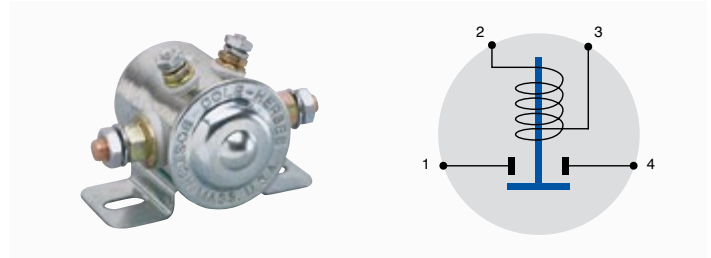
## Steel & Phenolic Body Relays

### Continuous Duty

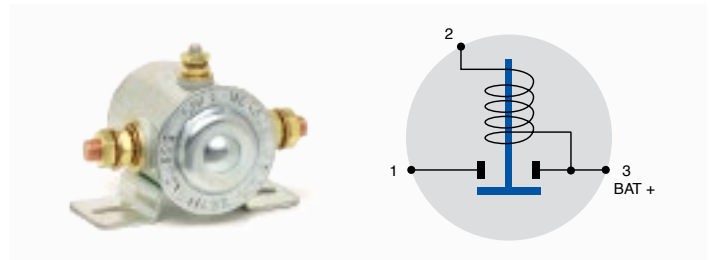
85A except where noted. Normally Open contacts, SPST, One circuit: Off - On. Housings: Plated steel (Phenolic where noted). Contacts: Copper 5/16" -24 thread, hexnuts and lockwashers included. 200A solenoids have silver contacts. Coil, ignition and ground terminals: Steel 10-32 thread, hexnuts and lockwashers included. Bracket mounting holes 5/16" x 19/32" (7.9 x 15.1) on 2 13/64" centers (56.0mm).

### 24V Insulated

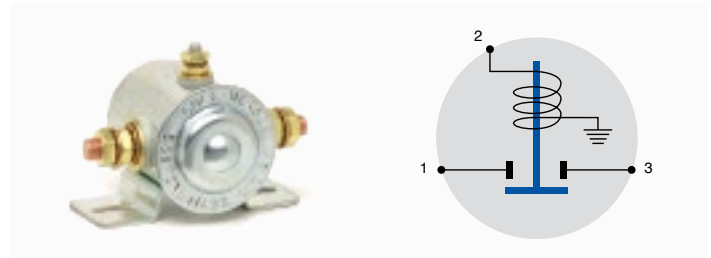
#### 24063



#### 24214, Rated 200A 24107



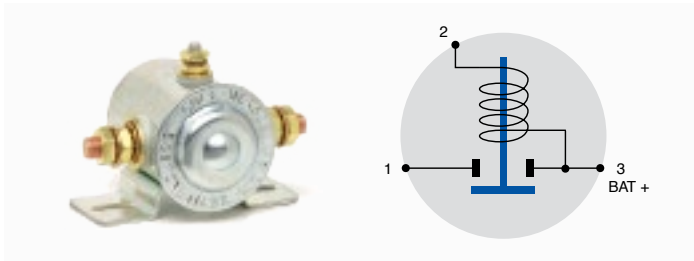
### 24V Grounded



## Continuous Duty (Cont.)

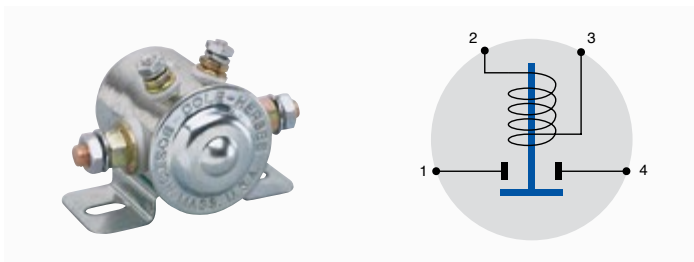
12V Insulated

24115



24059

24059-BP (Clamshell Retail Pack)

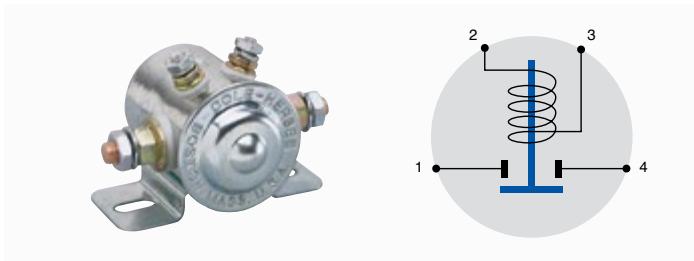


24213, 200A

24059-08, UL Listed

24059-08-BP (Clamshell Retail Pack)

Continuous Rating: 65A at 12V DC.  
Intermittent rating: 750A make, 100A break. 10 sec On, 30 min Off.



24213-03, 200A

Improved silver-tungsten contacts provide best conductivity. Pressure-wash resistant to IP66. Corrosion-resistant. PVC-coated.

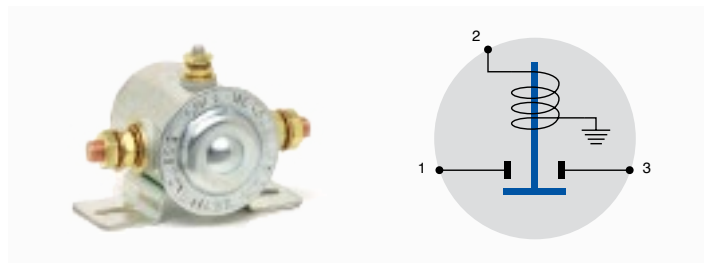
24213-05, 200A with Potted Coil



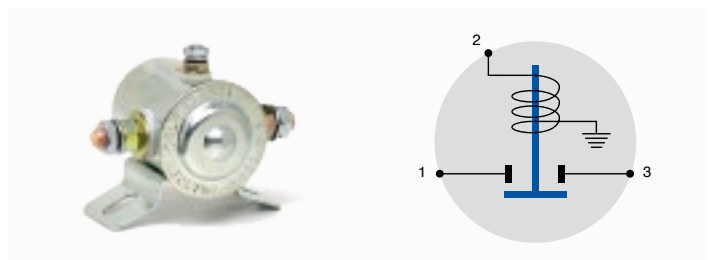
12V Grounded

24106

24106-BP (Clamshell Retail Pack)



24082, Curved Bracket

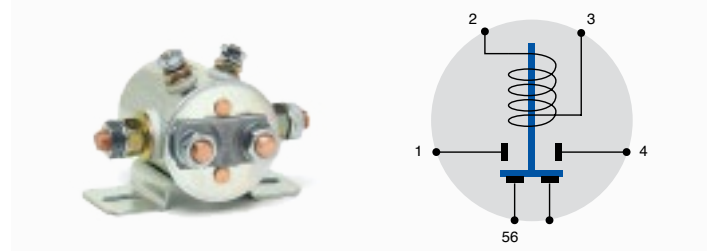


Two Circuits, SPDT

*Normally Off and Normally On. Special application: for forward and reverse systems in electric golf carts, garden tractors, fork lift trucks, winches, etc. Housing: Steel. Continuous Duty, Normally Closed contacts 35A, Normally Open contacts 85A.*

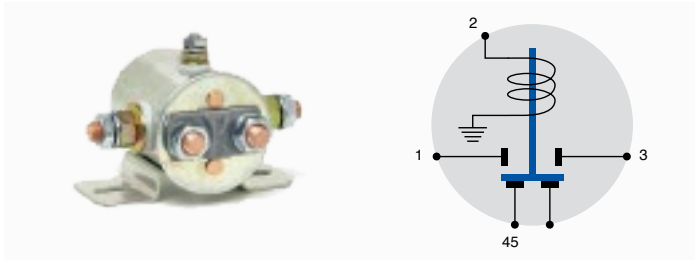
24402, 24V Insulated

24401, 12V Insulated



## Two Circuits, SPDT (Cont.)

### 24401-01, 12V Grounded

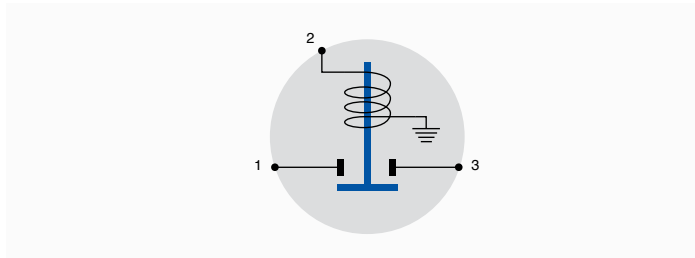


## Intermittent Duty

### Normally Off, SPST, One Circuit: Off - On

750A make, 100A break, 10sec On, 20min Off. Contacts: Copper. Terminals: Copper. Small ignition and ground terminals are 10-32 thread. Large contact terminals are 5/16" -24 thread. Hexnuts and lockwashers are included. Bracket mounting holes 5/16 x 19/32," 2 13/64" on centers (7.9 x 15.1, 56.0mm) and plated steel housing, except where noted.

### 12V Grounded



### 24037



### 24044, Curved Bracket



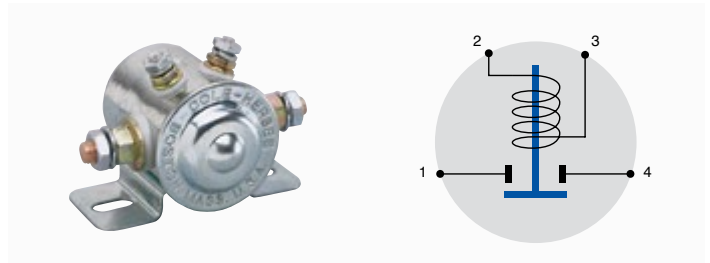
### 24022, Phenolic Housing

Bracket mounting holes 9/32" x 25/64", 2 7/64" on centers (7.1 x 9.9, 53.6mm). Contact terminal 5/16" - 24 thread.



### 12V Insulated

### 24047



## Bi-stable/Latching

When it comes to solenoids or relays, both bi-stable and latching refer to the same action. A bi-stable state is one in which a mechanism is at rest in two configurations, so a bi-stable relay is at rest in either the On or Off position. This is achieved by a mechanical or magnetic latching, so the plunger in a relay is latched On, and in the second actuation is latched Off. A more well-known example of the mechanical style is the mechanism of a retractable ballpoint pen, where the user pushes to move the ballpoint out of the housing, and pushes again to retract the ballpoint. The point remains in either of two stable states until the user presses the actuator.

In standard solenoids or relays, a control current has to be maintained in order to keep the plunger in the On position; in a bi-stable relay, control current is only applied when changing between the two states of Off and On. This provides many advantages – no current is used in the On or Off states, and bi-stable relays generate less heat.

See items 880103, 880107, 880086, 880088 and 24200.

## Solenoids or Relays?

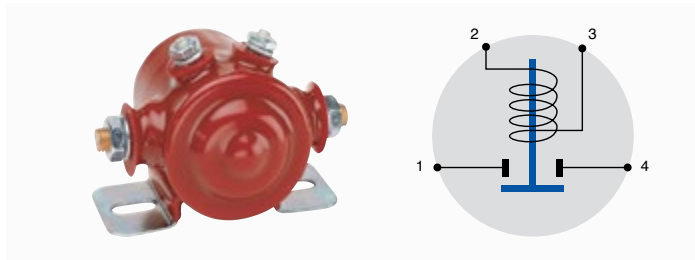
The two terms are interchangeable, referring to a type of remote switch. In the automotive context 'solenoid' tends to refer to the 'metal can' device, whereas 'relay' refers to all other such devices, including the small microrelays that you can find at the end of this chapter. The word 'solenoid' actually refers to the helical windings that create the magnetic force that pulls the plunger in the core. Whatever you call them, Littelfuse manufactures a very broad range of remote-acting switches.

## PVC Coated Relays

Weatherproof: Housing is completely PVC coated.  
Steel housings.

### Continuous Duty

Insulated SPST, Normally Off (except 24401-04). One circuit: Off - On. Bracket mounting holes 5/16" x 19/32" (7.9 x 15.1) on 2 13/64" centers (56.0mm).



#### 24117, 12V SPST

Continuous Duty: 85A.

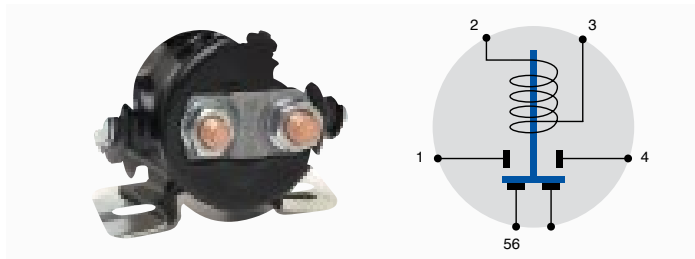
#### 24117-01, 12V SPST UL Listed

#### 24117-01-BP (Clamshell Retail Pack)

Continuous Duty: 65A at 12V DC  
Intermittent Duty: 750A make, 100A break.  
10 sec On, 30 min Off.

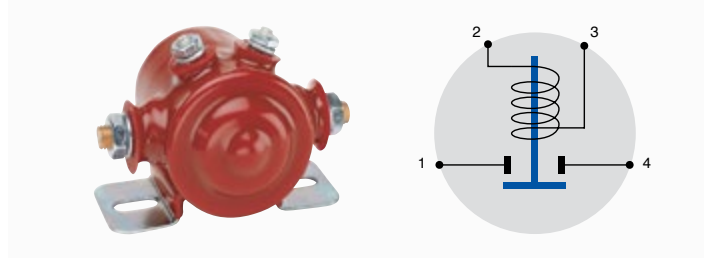
#### 24401-04, 12V SPDT

Normally Closed contacts 35A, Normally Open contacts 85A.  
Intermittent Duty SPST, normally Off, 750A make, 100A break  
750A make, 100A break. 10 sec On, 20 min Off. Bracket  
mounting holes 5/16 x 11", 2 13/64" on centers (7.9 x 15.1,  
56.2mm). Contact terminals 5/16" -24 thread.



## Intermittent Duty

24071, Grounded 12V SPST



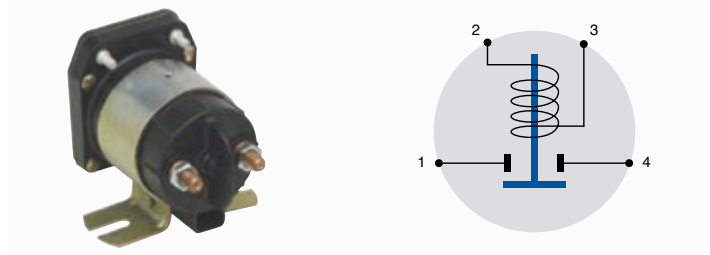
## Plastic Body Relays

Glass-filled nylon construction - lightweight, durable and resistant to corrosion. Suitable for heavy service.

## Continuous Duty, 225A

For use with heavy vehicles, materials handling, hydraulic systems, large DC machinery, and electric vehicles. SPST normally open contacts. Insulated.

L bracket. Large studs: 5/16"-24, two 10-32 stud coil terminals. 12V silver contact, 50k cycles. Copper contact cycle life 25,000 minimum. Maximum operating voltage 14V DC. Bracket mounting holes 5/16" x 19/32" (7.9 x 15.1) on 2 13/64" centers (56.0mm). Other brackets and voltages available by special order.



12V continuous duty coil, 225A make and break, 600A inrush.

#### 24812

Copper contacts.

#### 24812-01

Silver contacts

## Intermittent or Continuous?

Relays are rated for Intermittent Duty or Continuous Duty. Intermittent duty relays are rated with maximum On times and minimum Off times, which is a workable situation in many applications. Exceed those specs and you run the risk of burning out the coil windings. You cannot use an Intermittent Duty relay for continuous service, but you can use a Continuous Duty relay for intermittent service – although you would be purchasing a relay that is in excess of your needs.



## Continuous Duty, 100A

For starting small engines, including lawn tractors, golf carts and sweepers. SPST normally open contacts. 100A make and break, 400A inrush. Silver contacts. Maximum operating voltages: 14V for 12V type; 27V for 24V type; Large studs: 5/16" -24.

### 24624-10, 24V Insulated

F bracket, two 10-32 stud coil terminals.

### 24512-10, 12V Insulated

F bracket, two blade coil terminals.

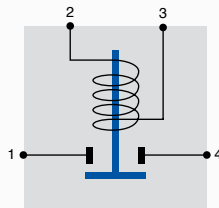
### 24612-10, 12V Grounded

F bracket, one 10-32 stud coil terminal.



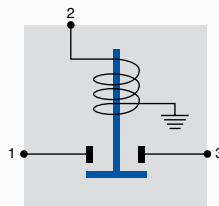
#### Insulated.

Shown: F bracket, stud terminals.



#### Grounded.

Shown: F bracket, stud terminal.



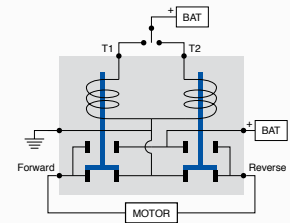
## Motor Reversing Relay

DPDT intermittent duty. 12V DC. Common ground coil. Two blade coil terminals, 5/16" -24 large studs. Copper contacts. F bracket. 75A make and break, maximum On time 5 mins. 125A make and break, maximum On time 30 secs. 150A make and break, maximum On time 0.5 secs. Allow 5 mins Off after max On time. Maximum operating voltage 14.5V DC. Cycle life 10,000 cycles at 5 secs On, 25 secs Off. Shipped with mounting hardware.

Use in conjunction with one of many types of Cole Hersee brand SPDT momentary switches: rocker (such as 58027-04), rotary (such as 72154- 01/02) or ignition-type keyed switch (such as 95060-43 or 75705-01).

Also available as 24V: 24450-02 with same rating as 24450. Contact Littelfuse.

## 24450



## Forward & Reverse Relay Module

### 24452 Forward & Reverse Module

Fully sealed to IP67 to accommodate harsh environments. Corrosion and moisture-resistant plastic housing. Rated at 50A at 12V DC continuous, 70A at 12V DC intermittent, max On time 5 mins, Off time 3 min. Ideal for tarp or lift applications as well as for hoists, hatches, winches/windlasses, snowplows, intake/exhaust fans, vehicle outriggers. Dynamic braking stops the motor when the control switch is turned to Off. Low profile module (less than 2" high) saves space in cramped installations.



## Forward/Reverse

We provide many solutions for switching the direction of a motor to fulfill functions in-out, up-down, clockwise-counterclockwise, intake-exhaust, and forward-reverse. Use the 24452 a sealed module with integral dynamic braking, featured on this page or the 24450. Other double-acting solenoids (previous pages) can be configured such as the 24402, 24401, 24401-01. You can also use Rotary switches 90005-03 and 75712-04.

## Ordering

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## Relays

### Heavy Duty & High Power Relays

General purpose relays fit many vehicles. Typical applications include: lighting, starting, horn, heating and cooling. Ignition protected to SAE J1171, Section 5. Standard ISO terminal footprint for Form A (SPST), Form C changeover (SPDT) and Form 2A (SPST, 2 terminals). Relays are available sealed and unsealed (unsealed are supplied with snap-in brackets.)

#### Specifications:

- » Pull-in voltage: 7.8V maximum at 12V DC, 15.6V at 24V DC.
- » Release voltage: 1.2V minimum at 12V DC, 2.4V at 24V DC.
- » Temperature range: -40°C to 85°C.
- » Operational life: Electrical to 100,000 cycles; Mechanical to 10 million cycles.
- » Contact material: Silver alloy.
- » Dielectric strength: 500V rms between coil and contact.
- » Insulation resistance: 100MΩ minimum (500V DC).
- » Vibration resistance: 10-40Hz double amplitude 1.5mm.
- » Relays are rated based on a steady state resistive load. De-rate according to the type of load: Motor load: Inrush can be 5 to 10 x steady state current. Solenoid load: Inrush can be 10 to 20 x steady state current. Incandescent lamp load: Inrush can be 10 to 15 x steady state current.

Relays are also available with PCB terminals. Contact Littelfuse.

### Heavy Duty Relays: 40A at 12V DC

#### Specifications:

- » Contact rating (Resistive load) at 20°C:
- » 12V DC: Normally Open 40A, Normally Closed 30A.
- » 24V DC: Normally Open 20A, Normally Closed 15A.



- » Contact arrangement: Available as Form A (SPST), Form C (SPDT) and Form 2A (SPST, 2 terminals).

### High Power Relays: 70A at 12V DC

#### Specifications:

- » Contact rating (Resistive load) at 20°C:
- » 12V DC: Normally Open 70A, Normally Closed 60A.
- » 24V DC: Normally Open 35A, Normally Closed 30A.
- » Contact arrangement: Available as Form A (SPST) and Form C (SPDT).



### MicroRelays 25A at 12V DC

MicroRelays fit many vehicles and applications. They have a reduced size, but can accept a 25A load. Typical applications include: lamp control, horns, power windows, fuel pumps, fans and lifts gates. Standard terminal footprint for Form A (SPST), Form C changeover (SPDT) MicroRelays are available sealed and unsealed.

#### Specifications:

- » Contact rating (Resistive load) at 20°C:
- » 12V DC: Normally Open 25A, Normally Closed 20A.
- » 24V DC: Normally Open 15A, Normally Closed 10A.
- » Contact arrangement: Available as Form A (SPST), and Form C (SPDT).
- » Vibration resistance: 10-40Hz double amplitude 1.27mm.
- » Pull-in voltage: 7.8V maximum at 12V DC, 15.6V at 24V DC.
- » Release voltage: 1.2V minimum at 12V DC, 2.4V at 24V DC.
- » Temperature range: -40°C to 85°C.
- » Operational life: Electrical to 100,000 cycles. Mechanical to 10 million cycles.



## MicroRelays 25A at 12V DC (Cont.)

- » Contact Material: Silver alloy.
- » Dielectric strength: 500V rms between coil and contact.
- » Insulation resistance: 100MΩ minimum (500V DC).

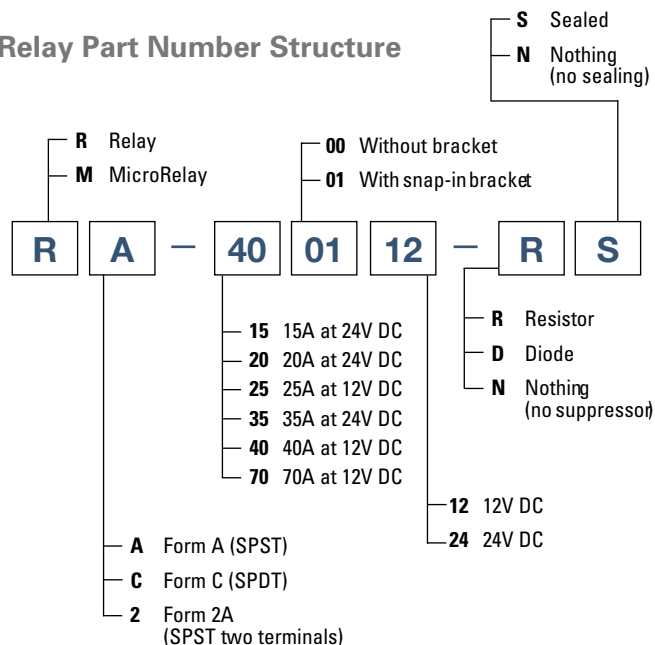
Cole Hersee brand relays are rated based on a steady state resistive load. De-rate according to the type of load: Motor load: Inrush can be 5 to 10 x steady state current. Solenoid load: Inrush can be 10 to 20 x steady state current. Incandescent lamp load: Inrush can be 10 to 15 x steady state current.

MicroRelays are also available with PCB terminals: contact

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### Relay Part Number Structure



## Relay Sockets

Accepts Cole Hersee brand relays and standard ISO relays. Modular – sockets dovetail together. Accepts standard quickconnect terminals. Easy mount bracket. Constructed of rugged glass-filled polyamide. Temperature range -40°C to 85°C.

### 99025, High Power Socket

For use with High Power relays. Form A (SPST).

Use with Tyco (AMP) terminals 280756 or 280755 (consult terminal manufacturers for full specs).



### 99026, Heavy Duty Socket

For use with Heavy Duty Relays. Form A (SPST) or Form C (SPDT).

Use with Tyco (AMP) terminals 42281 or Ark-Les 3000H112A series (consult terminal manufacturers for full specs).



## Relay and Microrelay Stock Items

Part No.	Description
R2-400112-RN	Form 2 12V Resistor Bracket
RA-200024-DS*	20A Form A 24V Diode Sealed
RA-400012-DS*	40A Form A 12V Diode Sealed
RA-400112-DN	40A Form A 12V Diode Bracket
RA-400112-NN	40A Form A 12V Bracket
RA-400112-RN	40A Form A 12V Resistor Bracket
RA-700112-DN	70A Form A 12V Diode Bracket
RA-700112-NN	70A Form A 12V Bracket
RC-200024-DS*	20A Form C 24V Diode Sealed
RC-200124-DN	20A Form C 24V Diode Bracket
RC-200124-NN	20A Form C 24V Bracket
RC-200124-RN	20A Form C 24V Resistor Bracket
RC-400012-DS	40A Form C 12V Diode Sealed
RC-400112-DN	40A Form C 12V Bracket Diode
RC-400112-NN	40A Form C 12V Bracket
RC-400112-RN	40A Form C 12V Resistor Bracket
RC-700112-DN	70A Form C 12V Diode Bracket
RC-700112-NN	70A Form C 12V Bracket
RC-700112-RN	70A Form C 12V Resistor Bracket
MC-250012-DN*	Microrelay Form C 12V Diode
MC-250012-NN*	Microrelay Form C 12V
MC-250012-RN*	Microrelay Form C 12V Resistor